OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **ONWAY LAKE** the program coordinators recommend the following actions. *We would like to encourage the association to conduct more sampling events in the future. With a limited amount of data it is difficult to determine water quality trends. Since weather patterns and activity in the watershed can change throughout the summer it is a good idea to sample the lake several times over the course of the season.*

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. Chlorophyll-a concentrations increased this season, and diatoms were abundant during the June sampling. Though the chlorophyll-a reading was higher this year it still remains below the New Hampshire mean. Spring rains likely increased the nutrient load washed into the lake and caused more algal growth this season. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. Water clarity decreased this season, which may have been a result of the ripples on the water surface. Water clarity can be influenced by such things as algal abundance, natural tea coloring of the water, and nutrient runoff from the watershed. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. Phosphorus concentrations improved in both the epilimnion and hypolimnion this season. Phosphorus concentrations were below the New Hampshire median reference line and we hope to see this trend continue. Maintaining phosphorus concentrations at low levels will help keep lake production low. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- Diatoms were the most abundant algae in June this year. They tend to be abundant in the spring and fall, with blue-green algae dominating in mid to late summer. Trace amounts of the blue-green algae *Coelosphaerium* and *Oscillatoria* were observed in the plankton sample this season. Since *Coelosphaerium* was the dominant algae in July last season, *we recommend testing once a month from June to August.* An increase in monitoring will help us to track nutrient inputs to the lake that are contributing to excess algal growth. Blue-green algae can reach nuisance levels when sufficient nutrients and favorable environmental conditions are present. While overall algae abundance continues to be low in the lake, the presence of these indicator species should serve as a reminder of the lake's delicate balance. Continued care to protect the watershed by limiting or eliminating fertilizer use on lawns, keeping the lake shoreline natural, and properly maintaining septic systems and roads will keep algae populations in balance.

- Conductivity (Table 6) decreased throughout the lake this season. The excess rainfall helped to increase the flushing rate of the lake, which tends to remove pollutants from the surface waters. The conductivity remains higher than desired for the lake. Conductivity increases often indicate the influence of human activities on surface waters. This decreasing trend is a positive sign. Septic system leachate, agricultural runoff, iron deposits, and road runoff can each influence conductivity readings.

- Dissolved oxygen was slightly depleted at the bottom of the lake in June (Table 8). The process of decomposition in the sediments

depletes dissolved oxygen on the bottom of thermally stratified lakes. As bacteria break down organic matter, they deplete oxygen in the water. When oxygen gets below 1 mg/L, phosphorus normally bound up in the sediments may be released into the water column, a process that is referred to as *internal loading*. Sampling once a month from June to August is recommended so that we can establish a trend in phosphorus concentrations for the lake. Also, we suggest having the DES biologist's visit occur in August next year. Dissolved oxygen tends to be depleted as the waters become warmer. Taking a dissolved oxygen reading in August will allow us to determine whether internal loading is a problem at Onway Lake.

- *E. coli* originates in the intestines of warm-blooded animals (including humans) and is an indicator of associated and potentially harmful pathogens. Bacteria concentrations were very low at the site tested (Table 12). If residents are concerned about septic system impacts, testing when the water table is high or after rains is best. Please consult the Other Monitoring Parameters section of the report for the current standards for *E. coli* in surface waters.

NOTES

- Monitor's Note (6/19/00): Saw loons.

USEFUL RESOURCES

Minimum Shoreland Protection Standards, WD-BB-36, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Wetlands: More Important Than You Think, NHDES Booklet, (603) 271-3503 or www.state.nh.us

Bacteria in Surface Waters, WD-BB-14, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Answers to Common Lake Questions, NHDES-WSPCD-92-12, NHDES Booklet, (603) 271-3503.

Effects of Phosphorus on New Hampshire's Lakes, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

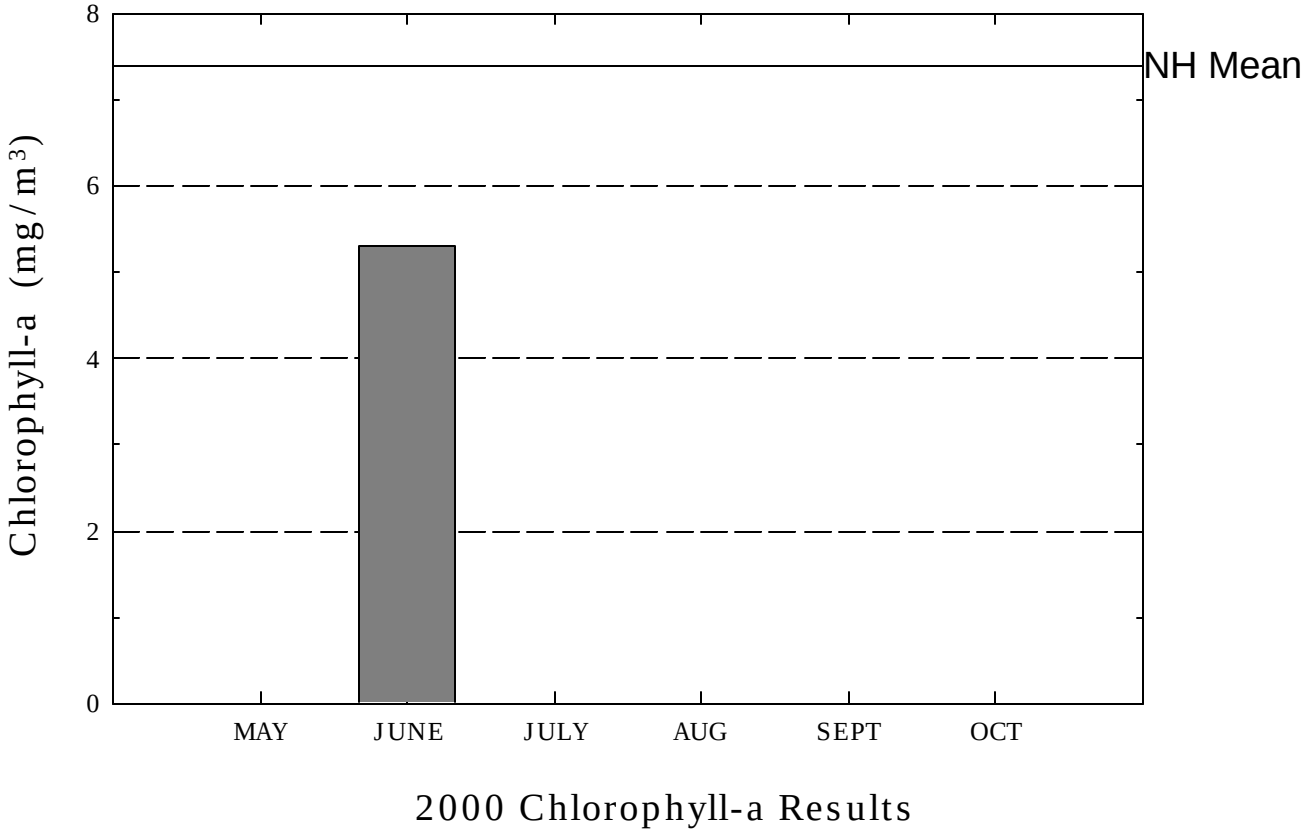
The Watershed Guide to Cleaner Rivers, Lakes, and Streams, Connecticut River Joint Commissions, 1995. (603) 826-4800

Through the Looking Glass: A Field Guide to Aquatic Plants. North American Lake Management Society, 1988. (608) 233-2836 or www.nalms.org

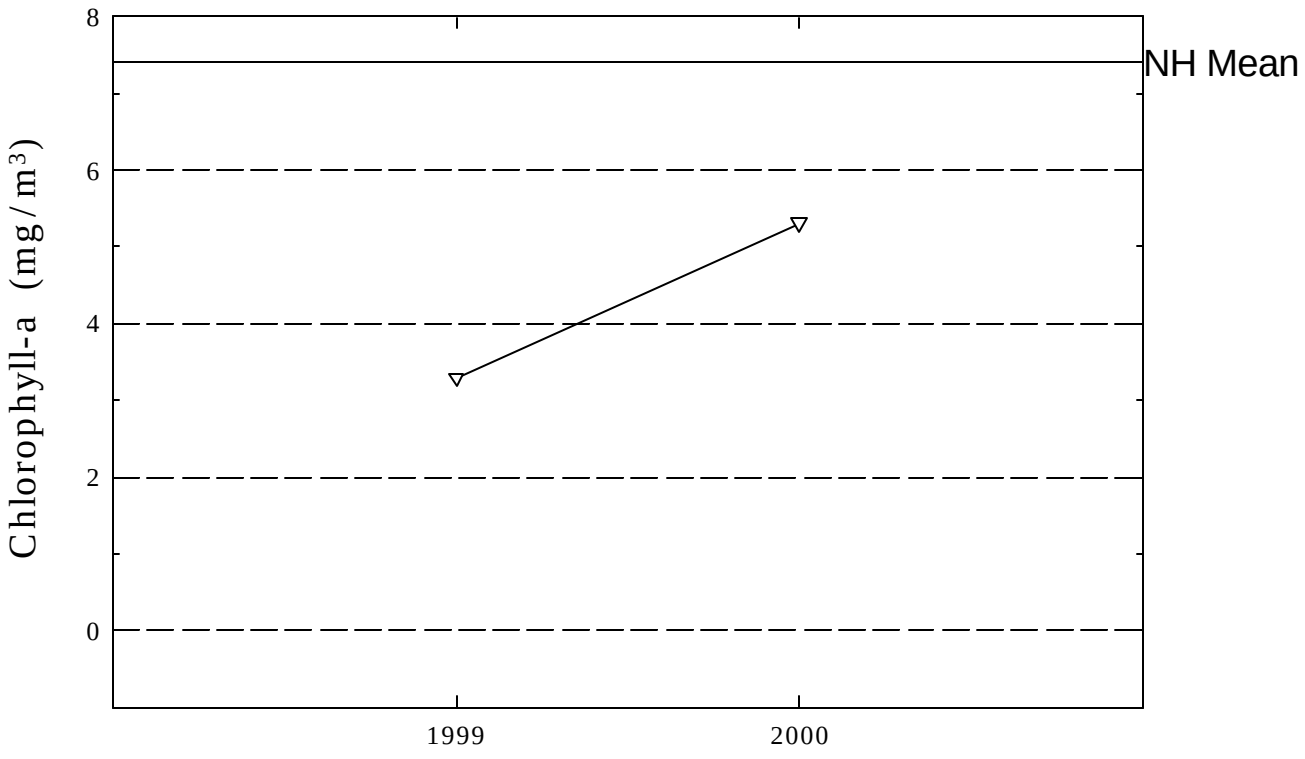
The Blue Green Algae. North American Lake Management Society, 1989. (608) 233-2836 or www.nalms.org

Onway Lake

Figure 1. Monthly and Historical Chlorophyll-a Results



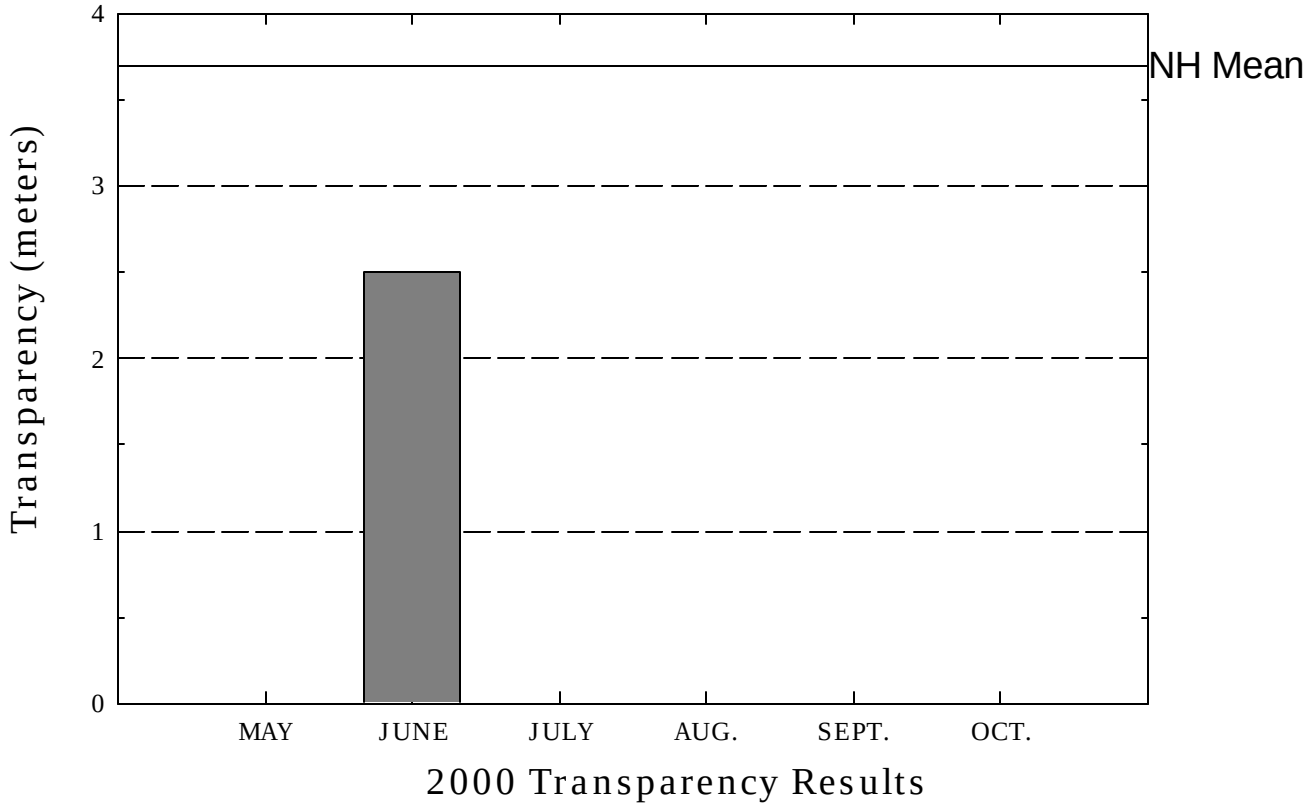
2000 Chlorophyll-a Results

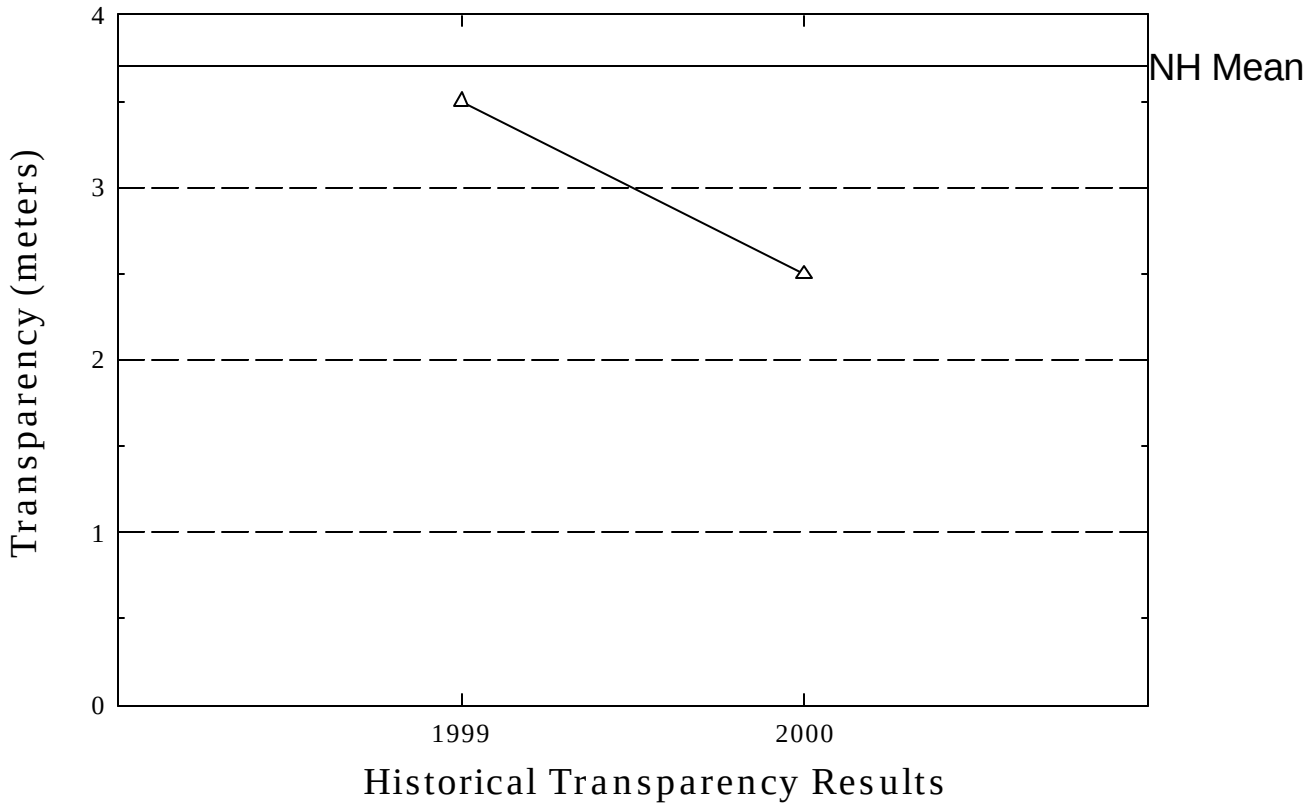


Historical Chlorophyll-a Results

Onway Lake

Figure 2. Monthly and Historical Transparency Results





Onway Lake

Figure 3. Monthly and Historical Total Phosphorus Data.

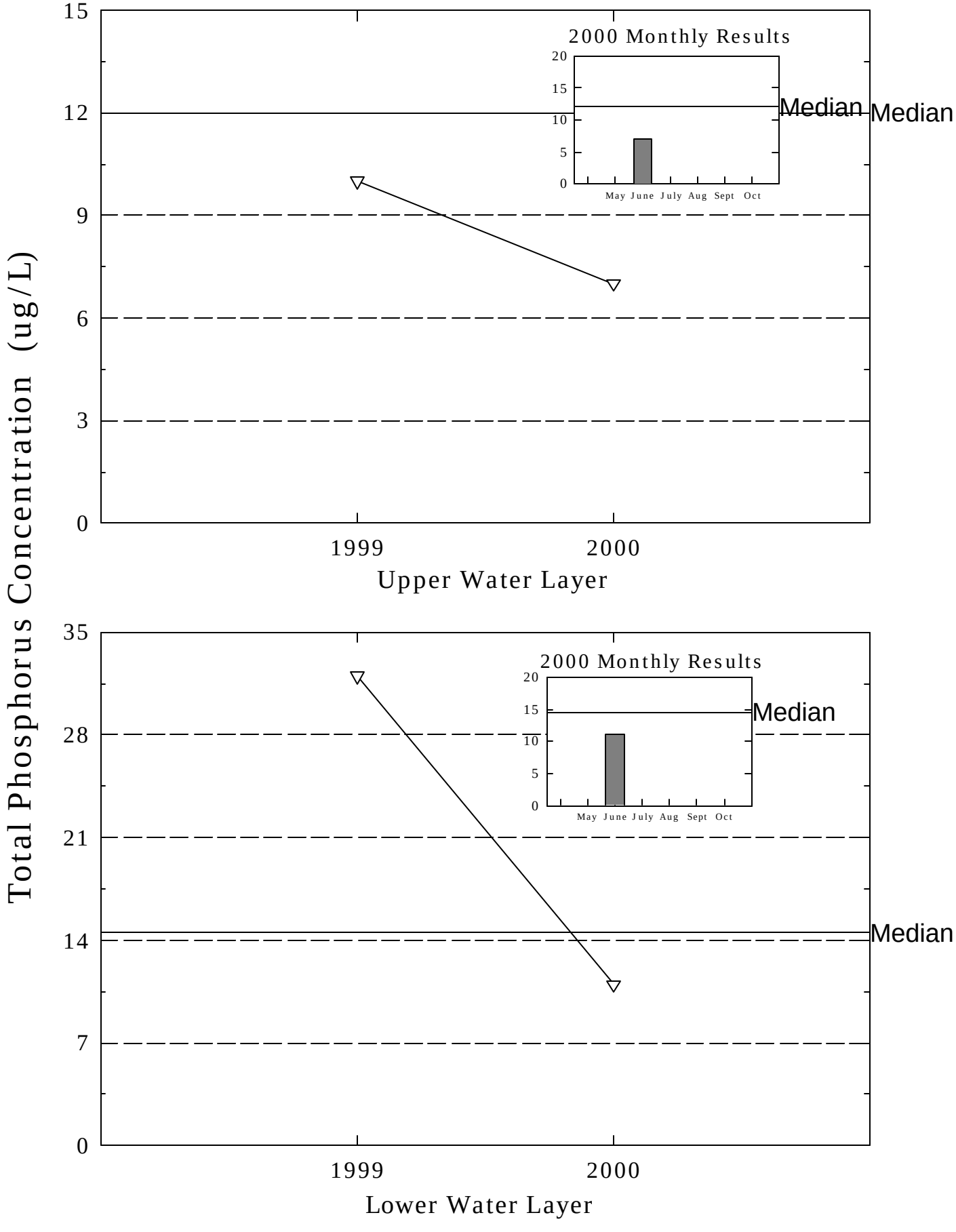


Table 1.

ONWAY LAKE
RAYMOND

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1999	3.29	3.29	3.29
2000	5.31	5.31	5.31

Table 2.

ONWAY LAKE

RAYMOND

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
07/22/1999	COELOSPHAERIUM	93
	SPHAEROCYSTIS	2
	MALLOMONAS	1
06/19/2000	ASTERIONELLA	85
	CYCLOTELLA	13
	CHRYSOSPHARELLA	2

Table 3.

ONWAY LAKE

RAYMOND

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1999	3.5	3.5	3.5
2000	2.5	2.5	2.5

Table 4.

ONWAY LAKE
RAYMOND

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1999	6.70	6.70	6.70
	2000	6.43	6.43	6.43
HYPOLIMNION				
	1999	6.40	6.40	6.40
	2000	6.22	6.22	6.22
INLET				
	1999	6.30	6.30	6.30
	2000	6.44	6.44	6.44
METALIMNION				
	1999	6.16	6.16	6.16
	2000	6.21	6.21	6.21
NO-NAME INLET				
	2000	6.57	6.57	6.57
OUTLET				
	1999	6.55	6.55	6.55
	2000	6.76	6.76	6.76

Table 5.

ONWAY LAKE

RAYMOND

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1999	6.10	6.10	6.10
2000	6.50	6.50	6.50

Table 6.

ONWAY LAKE
RAYMOND

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1999	168.1	168.1	168.1
	2000	141.4	141.4	141.4
HYPOLIMNION				
	1999	175.2	175.2	175.2
	2000	141.3	141.3	141.3
INLET				
	1999	224.1	224.1	224.1
	2000	182.0	182.0	182.0
METALIMNION				
	1999	162.8	162.8	162.8
	2000	142.6	142.6	142.6
NO-NAME INLET				
	2000	161.1	161.1	161.1
OUTLET				
	1999	169.8	169.8	169.8
	2000	140.7	140.7	140.7

Table 8.

ONWAY LAKE

RAYMOND

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1999	10	10	10
	2000	7	7	7
HYPOLIMNION				
	1999	32	32	32
	2000	11	11	11
INLET				
	1999	40	40	40
	2000	20	20	20
METALIMNION				
	1999	16	16	16
	2000	9	9	9
NO-NAME INLET				
	2000	8	8	8
OUTLET				
	1999	13	13	13
	2000	6	6	6

Table 9.

ONWAY LAKE

RAYMOND

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
		June 19, 2000	
0.1	22.3	7.6	87.2
1.0	22.0	7.5	86.3
2.0	21.7	7.5	85.2
3.0	18.2	6.5	68.4
4.0	16.8	5.5	57.0
5.0	15.1	4.3	42.7
6.0	13.2	3.1	29.6
7.0	11.7	2.3	21.4
8.0	11.2	1.9	17.5
8.5	10.9	1.7	15.4

Table 10.

ONWAY LAKE

RAYMOND

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 22, 1999	8.5	12.7	0.9	8.1
June 19, 2000	8.5	10.9	1.7	15.4

Table 11.

ONWAY LAKE
RAYMOND

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1999	0.8	0.8	0.8
	2000	0.5	0.5	0.5
HYPOLIMNION				
	1999	10.5	10.5	10.5
	2000	4.1	4.1	4.1
INLET				
	1999	2.2	2.2	2.2
	2000	1.0	1.0	1.0
METALIMNION				
	1999	1.8	1.8	1.8
	2000	0.5	0.5	0.5
NO-NAME INLET				
	2000	0.4	0.4	0.4
OUTLET				
	1999	1.1	1.1	1.1
	2000	0.5	0.5	0.5

Table 12.

ONWAY LAKE

RAYMOND

Summary of current year bacteria sampling.
Results in counts per 100ml.

Location	Date	E. Coli See Note Below
SANDY COVE		
	June 19	0

NOTE: "<" means "less than" and ">" means "greater than"